Midwest Engineer

SERVING THE ENGINEERING PROFESSION

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

LAKE DIVERSION AT CHICAGO — PAGE THREE

vol. 10 DECEMBER, 1957 No. 7

NEW PRODUCTS CORPORATION

INTEGRITY

QUALITY

SERVICE

HOME APPLIANCES

Cornerstones of the NPC Corporate Character . . . Expressed in

NPC

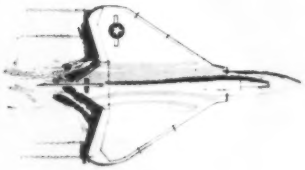
Die Castings

Aluminum–Zinc–Magnesium

OFFICE EQUIPMENT

PHONOGRAPHS

The NPC Corporate Character, expressed in the craftsmanship of every product, assures you of the highest quality in designing, tooling, casting, machining and finishing of die castings in zinc, aluminum or magnesium.



AIRPLANES

HAND TOOLS

CAMERAS

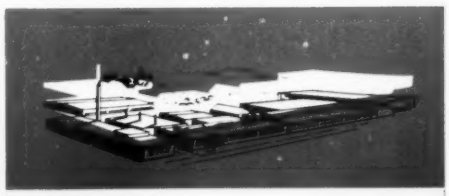
ELECTRONICS

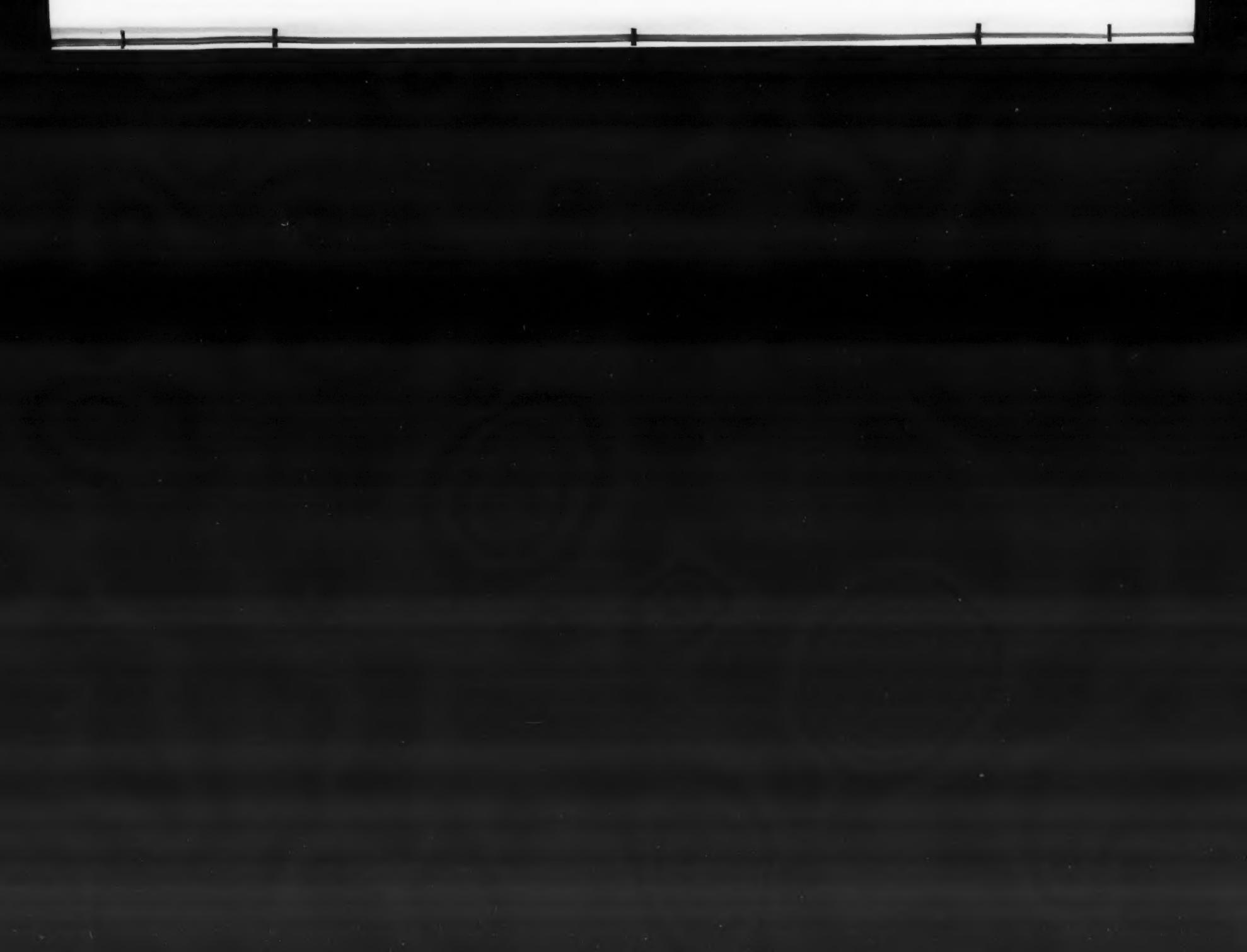
Industry finds integrity, quality and service in NPC products. Mindful of this deep responsibility, everyone at NPC continually strives to maintain the highest of standards. Tool makers and production craftsmen that take pride in their work, utilizing the latest in modern machinery, enable NPC to perform a broad service for varied industries.

New Products Corporation

P. O. BOX 666 • BENTON HARBOR 1, MICHIGAN

Since 1922





MIDWEST ENGINEER
Published Monthly
BY
THE WESTERN
SOCIETY OF ENGINEERS
AT
84 EAST RANDOLPH STREET
CHICAGO 1, ILLINOIS

GENERAL AND EDITORIAL OFFICES
HEADQUARTERS OF
WESTERN SOCIETY OF ENGINEERS
84 E. RANDOLPH STREET
CHICAGO 1, ILLINOIS
TELEPHONE: RANDOLPH 6-1736

Single Copy .....$ .50
Annual subscription 4.00
Foreign subscription 6.00

Entered as second-class matter at the post office at Chicago, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

December, 1957 Vol. 10, No. 7

CONTENTS

COVER STORY

Chicago's weather can be cold. The cold, however, can make the city bright and beautiful. This is demonstrated by the mass of ice at the North Avenue beach.

— United Press

The Officers

and the

Board of Direction

of the

Western Society of Engineers

Express their Wholehearted Good Wishes

to

All Members and their Families

for a

Happy New Year

O. J. Smith

Lake Diversion at Chicago

By Anthony A. Olis

I am honored to appear today before the Western Society of Engineers to discuss, in the short time allowed, a brief and new suggestion on the subject of "Lake Diversion at Chicago." In view of the exclusive professional make-up of your Society, you probably are familiar with the problem as a whole and I, therefore, will not attempt to review the history of the subject.

As President of The Metropolitan Sanitary District of Greater Chicago, and particularly in appearing before Congressional Committees, I have had an opportunity to observe at first hand the sources and nature of much of the opposition to increased diversion at Chicago.

The perennial leaders are spokesmen for Milwaukee, certain of the Lake States and Canada, and the shipping and power interests.

The opposition voiced by the spokesmen for Milwaukee, the Lake States and Canada I am convinced are primarily for their selfish political purposes as factually and legally their position is devoid of merit.

Recently, for example, one of their elder statesmen in offering certain presentations for the Congressional Record referred to our diversion problems as the "Chicago Water Steal." This appellation may well be compared to the "Big Lie" technique resorted to by both Hitler and the Communists whereby repeated repetition is believed will convince the people of its truth, whereas it is actually a deliberate distortion of the true facts.

But over the years the opposition from some of our opponents has mellowed. For instance, on the navigation phase of opposition to the diversion measure a recent editorial of the CLEVELAND PLAIN DEALER of May 26, 1957, should be of interest as coming from an unbiased source and from a publication that previously opposed diversion. It reads as follows:

(Editorial from the Cleveland Plain Dealer, Sunday, May 26, 1957)

"ROUND 57 of the Chicago water battle has just ended in favor of the Windy City by a 222-143 point count. The round number approximates the years this famous debate has fumed; the points are symbolic of the most recent House of Representatives vote approving increased diversion.

If the Senate and President Eisenhower (who twice previously has vetoed like efforts) concur, for a three-year "test" period, Chicago will be allowed to flush 2,500 cubic feet per second down her barge and sewage canal.

That's 1,000 c.f.s. more than at present. In gallonage it would total 1.62 billion per day. A trifle when compared to the 126 billion gallons which daily go down the drain at Niagara Falls, it still represents no mean stream. Greater Cleveland on the steamiest of summer days consumes less than a third that amount.

OVER THE YEARS we've listened to some fairly vivid language on diversion. From a position of resisting Chicago's efforts the Plain Dealer has come around to approving them—with reservations.

The main reason is that the health and welfare of a great metropolitan area are paramount over lake shipping interests and any considerations of hydro-electric development.

An unpolluted Lake Michigan — at least in the Chicago area — where the public can play and bathe in safety, puts other Great Lakes cities to shame.

IN NO WAY do we underrate the importance of ore carrying to Cleveland. But we do dispute the argument of the Lake Carriers Association that 3/8ths of an inch of lowered water is a serious financial threat.

The 3/8ths figure is what the Army Engineers estimate a three-year, 1,000 c.f.s. additional siphon will do to Lake Erie.

If diversion were a genuine menace, the various steel companies would be loud to say so. They'd be getting less ore cheaply by water and paying more for rail haulage.

U. S. Steel Corp., Republic and Youngstown Sheet & Tube, all operators of mills near Chicago on Lake Michigan, have stayed remarkably silent. Yet Lake Michigan's level would be lowered more than any of the others. Inland Steel Corp., another Chicago area producer, also is indifferent toward diversion.

NEXT WEEK much to do will be made over at Detroit when dredging is inaugurated on the $150 million "connecting channels" project.

This will deepen passageways between the lakes to accommodate St. Lawrence Seaway traffic. Depth will be 27 feet, enough to clear vessels drawing 25½ feet.

It may appear inconsistent to be spending major sums to provide more water and at the same time allow Chicago to take a little bit of that water away. Once completed, the dredging will provide ample clearance for any type of vessels; diversion won't matter."

Another traditional and very bitter opponent to additional Lake Diversion was downstate Illinois.

In 1947 I was privileged to be a member of the Illinois Water Resources and Flood Control Board appointed by the Governor to study conditions in the

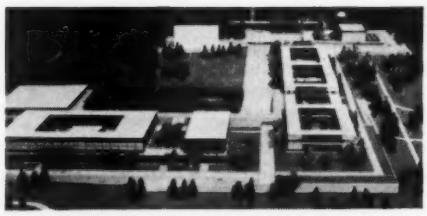
Mr. Olis, President, The Metropolitan Sanitary District of Greater Chicago, presented this talk before the Wesetrn Society of Engineers on Oct. 16, 1957.

One of the three C-E LaMont Hot Water Boilers being installed at Forbes Air Base, Topeka, Kansas.

Maybe hot-water heating doesn't sound like a new development to you. But it may be news to you that water at very high temperatures – up to 470° F and 500 pounds pressure – is coming to the fore as an advantageous method of heating large areas.

A big factor in bringing this trend about is the C-E LaMont Controlled Circulation Hot Water Boiler. Using the same principle applied by C-E in many of the country's largest utility boilers, this new boiler provides a degree of temperature control that makes it the most attractive method of heating in many cases. Examples of highly successful applications are industrial plants, large institutions, air bases and other military installations.

There are many cases, of course, where steam may still be the best choice. But here is an important point: whichever may be best for you, C-E, with its complete line of boilers of all types, can supply the equipment best suited to your particular situation. And, Combustion's wide experience is available to you and your consultants in finding the right answer. For details on C-E high-temperature water boilers, write for Catalog HCC-2.



Model of the country's newest service school, the U. S. Air Force Academy at Colorado Springs, where five C-E Hot Water Boilers will serve living, academic and service areas. Recognition of this system's advantages is shown by the fact that this same type of equipment is in service or on order for such Air Force Bases as Dover, Portsmouth, Forbes and McGuire . . . for industrial plants like Convair Astronautics Div. of General Dynamics Co., The Cross Co., Erie Mining Co. and Marquardt Aircraft Co. . . . and for such institutions as the A. E. Smith High School in Riverview, Mich.

COMBUSTION ENGINEERING

Combustion Engineering Building
200 Madison Avenue, New York 16, N. Y.

B-991

ALL TYPES OF STEAM GENERATING, FUEL BURNING AND RELATED EQUIPMENT; NUCLEAR REACTORS; PAPER MILL EQUIPMENT; PULVERIZERS; FLASH DRYING SYSTEMS; PRESSURE VESSELS; SOIL PIPE

Illinois Waterway and the lower Illinois River. Our Committee, among other matters, finally recommended to the Governor an additional diversion of 2,000 c.f.s. in order to supply needed dissolved oxygen in the waterway.

In connection with our Report, members of our Committee addressed numerous civic groups in communities along the waterway and presented our studies and proposed recommendations. These recommendations were not only looked upon with disfavor but actually there were intimations of various forms of battery being visited upon us, the milder tvpe being "necktie parties," "tar and feathers," "riding on a rail," etc.

The most outspoken of these communities was the City of Peoria and the Peoria newspapers were persistent and emphatic in their opposition in expressing the views of the residents. It is therefore gratifying to now see that Peoria has changed its position on diversion. The following is an editorial appearing in the Peoria Journal Star on August 24, 1957:

(Peoria Journal Star
Saturday, August 24, 1957)

"THE LAKE MICHIGAN diversion bill is side-tracked again in Congress, with no chance to get on the main track until January.

Ten years ago we would have considered this good news, but not now. Chicago's treatment of its sewage is now such that the Illinois Valley would welcome a greater volume of lake water coming through the sanitary district and down the Illinois River, at least as a three-year experiment.

Only flimsy objections to this experiment have been heard from other lake states and Canada.

A good case has been presented for the experimental increase in diversion, but it has been endlessly delayed by votes and parliamentary technicalities.

Illinoisans in Congress should step up their fight for diversion in January. And the people of Illinois should give them hearty support."

Diversion into Great Lakes

But Canada's opposition seems to be unrelenting and as unsoluble as the Gordian knot. And this is the suggestion I would like to make today as to this phase of the problem.

Canada is presently diverting 5,000 c.f.s from the Hudson Bay watershed into the Great Lakes watershed at Lake Superior. This diversion started in 1939, by Canada (without consultation with the United States), by diverting 1,000 c.f.s. of water from the Kenogami River, a tributary of the Albany River, through Long Lake into Lake Superior.

Thereafter, in July 1943, (after consultation with the United States) 4,000 c.f.s. from the Ogoki River, above the Waboose Rapids, was diverted.

The foregoing diversions at Lake Superior *into* the Great Lakes System totaling 5,000 c.f.s. has raised Great Lakes water levels an estimated 3 inches.

When the Senate Sub-Committee was holding hearings on H. R. 3210 (84th Congress) the above facts were considered and the Senators suggested that if Canada would divert an additional amount into Lake Superior it would fur-

(Continued on Page 19)

We're in business at our new Meter Shop...

Penny Flame recently announced the completion of our new Meter Shop in LaGrange. Modern from front door to back, it has the "very latest" for efficient, economical meter testing and maintenance.

This has become a sizable operation in recent years due to the tremendous number of new customers who have come on our system. Presently some 640,000 meters are needed in the Company's operation and each of them must be given a rigid accuracy test periodically to meet Illinois Commerce Commission requirements. More than 100,000 meters will be processed in the shop annually, including about 40,000 new ones used for new installations or for replacements.

The Meter Shop is one of the important projects included in the substantial construction program which the Company has undertaken to keep pace with the growing use of gas throughout northern Illinois. It's part of our plan to continue bringing our customers the finest natural gas service possible.

If you would like to visit our new Meter Shop and see it in operation, just write E. A. McGraw, Meter Superintendent, Northern Illinois Gas Company, 615 Eastern Avenue, Bellwood, Illinois, or phone Linden 4-5700.

PROMPT . . . COURTEOUS . . . DEPENDABLE SERVICE

WSE Sponsors Conference

The United States is a complex maze of advancing technology. Increasing demands for a well-educated reserve of young people trained in the fields of science and engineering are being made on our colleges and universities. The manner in which these demands are met may determine our survival as a nation.

On Oct. 31-Nov. 2, the nation's leading educators, industrialists, and govenment officials met at the Edgewater Beach Hotel in Chicago to confer as to how to effectively meet the present situation and prepare for the future. This Conference on Scientific and Engineering Education was sponsored by The Engineering Manpower Commission of Engineers Joint Council, American Society for Engineering Education, National Academy of Sciences, National Research Council, National Science Foundation, and Scientific Manpower Commission. The Conference was under local sponsorship of Western Society of Engineers.

What are our colleges and universities doing to cope with the problems they face in educating scientists and engineers? Are secondary—and even elementary schools doing their full share in encouraging young people to explore these fields? What portion of responsibility for training really good scientists and engineers should rest with the local level, and what portion should be assumed at the national level? These and other questions were studied for possible solutions. Recent international developments, particularly in the fields of intercontinental ballistic missiles and the realization of an earth satellite by the Soviet Union, have made imperative the answers to these questions and a general redefinition of the problem areas faced by our colleges and universities.

Ike's Message

President Eisenhower sent the following message to Dr. J. C. Warner, general chairman of the Conference, emphasizing the importance of the problems under examination.

"To all attending the National Conference on Engineering and Scientific Education, I send greetings.

Education is a vital part of our national strength and helps to secure the progress of mankind. The growing needs of our economy, defense and community life require an ever-increasing emphasis on the training of future engineers and scientists. In our efforts to free the peoples of the world from ignorance and poverty, there are unlimited opportunities for careers of distinguished service.

Congratulations for your splendid work in this area and best wishes for a memorable conference."

/S/ DWIGHT D. EISENHOWER

Among the noted speakers were Stephen L. R. McNichols, governor of Colorado and Marion B. Folsom, secretary of Health, Education and Welfare.

Governor Views Impact of Sputnik

In his address, Governor McNichols said in part : "... On October 4 last, the Russians successfully launched an earth satellite. That event has dramatically underscored, as perhaps no other single happening could, the tremendous significance and importance of our pool of scientific and engineering manpower —and the use we are making of this reservoir of talent. More especially, the earth satellite has jolted us from our attitude of invincibility, indelibly impressing on us the terrible and urgent need to take a long, objective look at ourselves and where we as a nation must direct our efforts. That look must tell us where we are going and how we are going to get there.

"... Let's assess the significance of the satellite and the impact of that significance on a problem which has existed *before* the satellite—and without reasonable solutions can be expected to continue to exist: the shortage of scientific and engineering manpower. We can conclude at least two firm facts from the fact of the satellite, and we can make at least two general observations. Certainly we now know that engineers in the USSR probably are able to fire an object from a point in Russia to virtually any other point on earth. In addition, we must recognize that Soviet scientists and technicians are capable of carrying our tasks of the utmost difficulty and complexity,

with the advance of Soviet technology surprising even the best-informed people in this country.

"In short, a nation with a relatively low standard of living, which decries individualism, which has a fanatic belief in its own invincibility, has not only beaten us in an important phase of a new and extremely complex scientific future, but has gained a great advantage in the arena of world politics which now makes it possible for the Soviets to negotiate from a position of power.

"Since, from the Soviet point of view, this is a desirable situation, let's see what has placed them in this politically enviable position. Let's devote our energies to making an appropriate response to this challenge. For it is clear that the challenge to us lies in the Soviet system of higher education which has produced this satellite . . .

". . . In America we have fallen into a characterization of ridicule for the 'long-hair'; the 'egg-head'. Not alone is this a deterrent to students, but it is a strange distortion of values which may be measured by the incentives which appear to award the crooner or the athlete in prestige and remuneration at far greater rates than the teacher. Far from persisting in this distortion of values, we need to remember that it was a group of Russian 'egg-heads' which conceived and launched the satellite."

"Facts of Life" in Soviet Engineering Education

Discussing the comparative Soviet educational system with the American, Dr. Nicholas DeWitt, of the Russian Research Center of Harvard University said:

". . . The Soviet Union runs a very peculiar educational system. In common with the American tradition of public education, the Soviet system is said to be designed for so-called mass education. This is particularly true of the Russian 10-year general education school, the counterpart of our 12 year system of primary and secondary education. Some 28 million children attend these schools in Russia today. This point is, however, that of the 9,500 instruction hours given during the 10 years in these schools, about half are devoted to sciences and mathematics. This is part and parcel of 'general education'—Russian style. The curriculum is standard for the country as a whole, and there are no electives. Every pupil *has* to take five years of physics, six of mathematics, three of biology, four of chemistry, six of foreign languages, and so on. Either the youngster succeeds in passing the required subjects or, if he fails, he is out, and is absorbed by an elaborate system of trade and vocational schools.

"The standard curriculum and the selective process of the 10-year schools are those in common with European educational practice. This year (1957) about 1,500,000 were graduated from Soviet 10-year schools. This means that only about one third of those who entered school 10 years earlier succeeded in graduating. But note that each one of those who *did* graduate had, roughly speaking (in terms of hours devoted to science subjects), *five times more* than the minimum stipulated for entrance to a school the calibre of the Massachusetts Institute of Technology . . ."

Engineering Education's Major Problems

In summarizing the problems confronting American higher education today, particularly in the fields of science and engineering, Dr. Lee A. DuBridge, President of the California Institute of Technology said in his address to the Conference:

". . . We now spend 3 billion dollars a year in operating our universities and colleges—about $1000 per student. It is unlikely that the cost will go down; in fact, to bring faculty salaries to where they should be it must go *up*. Thus we

should add a billion dollars a year immediately to the budget, and by 1972 we may need to be spending $1400 per student, or 8 billion dollars a year for higher education—in addition to a billion a year needed for plant additions.

"All this," as President de Kiewiet of the University of Rochester recently remarked in a brilliant paper on the subject, "All this is absurdly too much." "Or" he adds, "*is it?*" He goes on to point out that American industry is spending at the rate of 25 billion dollars a year for new plant facilities. Southern California alone is spending a billion dollars for new plants. American Telephone and Telegraph spent a billion dollars last year on new telephone equipment. If we can spend that much helping people talk to each other, might we not spend an equal amount in helping them have something to talk about? Furthermore, 3 billion dollars a year is only 75 cents out of each $100 of Gross National Product. In 1972, 8 billion dollars will be only $1.30 out of the projected GNP for that year.

"The bill has got to be met. The American people will not tolerate having half their qualified youngsters refused admission to college. The only question is: When shall we pay, and how? Shall we meet the bill soon enough—or too late?

"Shall it be by private gifts or by taxes, or by how much of each?

"So much for the quantitative side — a staggering job to be done at a staggering price. But quite a manageable job for the American people.

"Let me add one more point. It is not the universities that are begging for all this money for their own aggrandizement. Most of them would prefer to stay at their present size—and just turn away an ever larger fraction of the less-than-brilliant applicants. It is up to the American people to decide whether they want this solution or not. If not, they must pay the bill . . ."

The purposes of the "Conference on Engineering and Scientific Education — Foundation of National Strength" were to highlight the unique problems of higher education in science and engineering and explore remedial measures; and contribute to general understanding of the problems of higher education in technology and the need to rally our Nation's resources to meet the challenge.

The Conference's success in doing this will be measured in terms of subsequent public action—in the final analysis, the only means by which positive results may be attained.

I.I.T. Holds Eighth Drafting Competition

More than 6,000 students are expected to participate in the eighth annual Chicago area drafting competition sponsored by Illinois Institute of Technology's technical drawing department.

Slide rules, professional drafting equipment, scholarships to Illinois Tech — over 100 prizes in all — will be awarded at an honors assembly in February, according to John T. Dygdon, contest director and assistant professor of technical drawing at IIT.

The contest is open to students from high schools and vocational schools throughout the Chicago area. Students interested in entering the contest may make application through their high school drafting teacher.

The contest, which opened Nov. 15, will close Jan. 29. Judges will be engineers from local industries and instructors from local colleges.

Competition will be held in five divisions, ranging from basic drafting through advanced machine drafting. Problems selected for the contest are largely from classroom projects and are associated closely with regular school work.

Battlefront Plant Produces LOX

Air Products, together with the U. S. Army Corps of Engineers has developed a million-dollar battlefront industrial plant on wheels that can produce liquid oxygen from common air in quantity to help power the Army's Redstone and other missiles through space. The first plant to be delivered under current contracts was publicly displayed for the first time at an Army exhibition for the Association of the United States Army, beginning on Oct. 27, 1957 at Fort Myer, Va.

Modern missiles require enormous amounts of propellant power. All sources of the power must be contained within the missile. In the Redstone missile and others that power is obtained by burning ethyl alcohol with liquid oxygen. A jet plane needs carry only fuel; air to burn the fuel is scooped from the atmosphere through which it flies. But a missile rises to heights, at which, for practical purposes, there is no air. Just as men in space travel would have to carry oxygen to breathe, so super-stratospheric missiles must carry not only fuel but huge quantities of an oxidizer to burn the fuel. Various chemicals may be used to release oxygen, but weight for weight none packs the concentrated oxidizing power of oxygen itself.

Everyone knows that simply blowing air upon a fire makes it burn more fiercely, for air is one-fifth oxygen, and the draft of air is in effect a force-feeding of extra oxygen into the flame. If, instead of air, oxygen gas is blown into a furnace, its heat reaches the intensity of a steel mill, for pure oxygen has more than four times the combustion power of air. But liquid oxygen has 600 to 800 times the combustion power, volume for volume of gaseous oxygen. It can be carried without compression in relatively light-weight containers. It is to obtain this amazing concentration of energy potential that the military has turned to LOX for its missiles. Liquid oxygen is now regarded as a mainstay of missile development and use.

Liquid oxygen, commonly called LOX, is a fantastically cold, light-blue liquid a trifle heavier than water. In missile work it is produced and handled at a temperature of about 297 degrees below zero. It packs in relatively stable form an amount of releasable energy comparable to that of TNT. When combined with acetylene or certain other hydrocarbons, it explodes with the detonation characteristics of a high explosive, and is used with carbon as an explosive in certain types of mining. But if treated with a few simple precautions, it is stable and relatively easy to handle.

This liquid is so cold that a tennis ball, after being dipped in it, will shatter like a light bulb when dropped; the petals of a flower will break like a Christmas tree ornament; tough steel becomes as brittle as glass; a banana can be crumbled into powder; and a match-box full of mercury will freeze hard enough to drive a nail. Liquid oxygen spilled in a man's hand will cause a burn-like injury that takes months to heal.

Because liquid oxygen boils away rapidly, it cannot be stored in any quantity for any length of time. Yet modern missiles, whether in flight or standing ready for need, require large quantities. Air Products' factory on wheels solves this problem by making it possible to produce the LOX cheaply and in quantity near the missile-launching site.

The Plant

The 20-ton plant, developed by Air Products, Inc., of Allentown, Pa., is mounted on four semitrailers. It is designed to produce 20 tons, or about 80 barrels, per 24-hour day of 99.5 percent

pure liquid oxygen when operated at normal atmospheric pressure in air of 50 percent relative humidity. It will operate in outdoor temperatures ranging from 125 degrees above to 25 degrees below zero Fahrenheit. It uses about 920 pounds of diesel fuel per hour and yields about two pounds of LOX per pound of fuel oil consumed.

Two of the trailer units are identical. Each carries a 1,200 horsepower Fairbanks-Morse diesel engine, air-cooled to eliminate the need for water supply, and a Fairbanks-Morse rotary-type compressor which compresses air to 100 pounds per square inch. There is also a space provided for the mounting of an electric generator, should it be desired to use the diesel engines for the production of power. There is also an extended-surface heat-exchanger arrangement for cooling the engine and compressor and for a preliminary cooling of the compressed air as it leaves the unit. Each of these semi-trailers measures 8 by 30 feet, a little over 11 feet high, and weighs about 50,000 pounds.

The compressed air is fed into a heat exchanger, mounted on a third trailer. Here the air is passed through chambers cooled by intensely cold by-product nitrogen passing back from further stages of the process. The water vapor, carbon dioxide, and other impurities are frozen out. A system of reversing valves and check valves permits the air periodically to be re-routed through alternate passages while a blast of nitrogen ejects deposited impurities. When it emerges from this unit, the air is very near to liquid state. This semi-trailer unit is about the same size as the engine-compressor units and weighs 46,000 pounds.

The fourth semi-trailer contains the air separation unit where the cold, compressed air is processed into liquid oxygen and by-product nitrogen. First, the air is partly liquefied by heat exchange with discarded nitrogen gas. The liquid air is separated from still unliquefied gaseous air by a centrifugal separator, subcooled, and passed into the distillation column. The remaining gaseous air is returned to the exchanger unit partially re-heated, and reprocessed through an expansion turbine.

As nitrogen and oxygen evaporate at different temperatures, when the liquid air is heated in the distillation column by a device called a reboiler, the nitrogen passes off first as a gas and may be stripped from the still-liquid oxygen. This nitrogen is passed back to cool the liquefier and heat exchanger, and finally expelled. The oxygen is drawn off as product.

In the back of the distillation semi-trailer is a graphic control panel, where instruments keeping check on all major portions of the machinery and process are assembled at one point for constant easy monitoring by the operator.

This semi-trailer unit is of the same dimensions as the others and weighs 38,000 pounds. It is designed with great compactness, the distillation column being sunk in a well in the floor to provide the necessary height.

Under the present contract, Air Products, Inc., is manufacturing these plants for the Corps of Engineers at a price of about $1,000,000 each. Previously the Government had procured one-ton and five-ton plants.

The LOX, as it comes from the plant, may be hauled to the missiles or to storage tanks in special low-temperature hauling trucks.

The Outlook

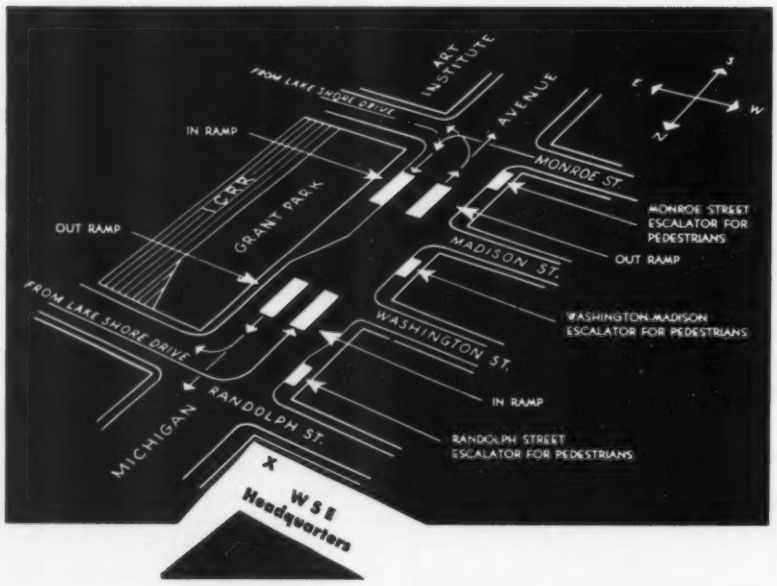
The business forecast for 1958 looks good if the latest doughnut-hole prediction is true, reports *Food Engineering*. The hole in the doughnut tends to increase during depression times. In good eras the hole is smaller. First of the year, the hole will shrink one-quarter inch.

SAY, ENGINEER!

Do you like to DRIVE?

Then why not drive to WSE meetings and other functions? There's plenty of PARKING almost at the door—the Underground Garage is diagonally across the street from WSE Headquarters (see the map below), two private garages are a block west, and the State-Wacker "Bird Cage" Garage is only a short distance away.

Below: map showing Park Department Underground Garage



Interior view of Underground Garage

If you're not driving it's still convenient to get to and from WSE meetings.

Here are handy stations or stops:

- The Cab Stand is just across the street
- The Elevated is one block west
- The Subway is two blocks west
- Buses stop at the door or within a few blocks for every part of town
- The IC Suburban station is across the street
- Other suburban stations are conveniently served by bus or elevated.

You see, your WSE Headquarters is at the handiest place in Chicago.

ENTER at either Monroe or Randolph Street on Michigan

EASY access, Speedy exit

ESCALATORS convey you to street level

CAPACITY The garage with its 2359 parking spaces, is designed to prevent overcrowding.

"Industry Not Responsible for Dust"

Only a minor portion of the dust-fall in a city like Chicago can be traced to industry, Edward C. Logelin, vice-president—Chicago, U. S. Steel Corporation, declared Dec. 14 in Chicago.

Even so, he said, industry is constantly active in doing something about air pollution.

Logelin addressed the Air Pollution Conference at a noon luncheon in the Congress Hotel.

He stated that most of the dust-fall is due to traffic, open fires, wind-blown dust from the farms and prairies of the middlewest, rubbish thrown into the streets, improper fuel and faulty combustion of home-heating plants.

"The greatest progress is made in those cities where the civic fathers call upon industry to help them in planning ways and means of policing their own industries. This is the type of program that gets cooperation, that utilizes the best brains of each individual industry," he said.

"The city which asks industry to set up advisory committees to aid in drafting air pollution ordinances gets the benefit of the experience of the men who know the plants and problems best. Moreover, it gets an ordinance suitable to local conditions, for after all, no two cities are the same either in meteorological conditions, direction of prevailing winds, kinds of industry or balance between industry, commercial and residential land use.

"Thus we must look to local men and local experience in developing our own program. When called upon to cooperate in this fashion, industry has always done so. The work of practical men, working first to set up standards for their industry and then to police the industry to make sure that the standards are observed, probably will prove to be much more effective in cutting and eliminating causes of air pollution than the rigid enforcement of any arbitrary set of standards based on today's knowledge and testing methods.

"The successful and effective air pollution control program recognizes this objective. It is drawn up and enforced to apply to the community's industrial operations as they exist. It is not planned with a Utopian concept such as might obtain if you are starting from scratch to build a new industrial community," he said.

Logelin pointed out that as new plants and machinery come into being, industry makes every effort to incorporate latest anti-pollution equipment, some proved and some still experimental.

"When an industry's engineers are starting from scratch to build a new plant, it is far different from plants built five, ten, fifteen or more years ago —just as each of those consecutively was a little better than the previous ones.

"But it is wholly impractical to think only in terms of new plants. Existing facilities, representing as they do investment of billions of dollars in plants and equipment, are necessary to the economy. Existing facilities must be taken into consideration in any program — they exist, they are desirable, and they cannot be replaced at one fell swoop," he declared.

Logelin added that cost is a major factor in installing controls and other pollution equipment on existing industrial facilities. He said that industry spends large sums on anti-pollution equipment not only to fulfill civic responsibility but also to create more efficient production of goods and services.

He cited examples of anti-pollution efforts made by U. S. Steel over the years. Existing blast furnaces and other basic steelmaking units are equipped with the latest anti-pollution facilities whenever they are re-lined or re-built.

Argonne to let GEORGE Do It

An electronic computer that runs on electricity produced by atomic power, and in turn helps scientists learn new facts on how to produce atomic power better, now is in operation at Argonne National Laboratory, Lemont, Ill.

Built and designed by Argonne, the new computer has been christened "GEORGE," so Argonne mathematicians will be literally letting GEORGE do it when they present this new machine with problems to solve.

Since Argonne generates much of its own laboratory electricity with its Experimental Boiling Water Reactor, GEORGE may well be one of the first electronic computers to use atomic power.

GEORGE is a high-speed digital machine capable of making 200,000 separate additions of numbers a second. A maze of electronic tubes, magnetic cores, wire and other parts, it is compact enough to be fitted into the average-sized living room. It runs on ordinary house current, at 115 volts. It is the first of three new electronic computers to be installed by Argonne.

The new machine, which was designed to perform scientific computations and mathematical reductions of research data, has been a laboratory work horse since it superseded an older Argonne computer, AVIDAC, this fall.

"We could set GEORGE to work playing chess, figuring out the orbit of a satellite, or picking out the probable winners of next week's football games," said Donald A. Flanders, head of the Argonne Applied Mathematics Division.

"However, we have so much to do—computations aiding basic research into the nature of matter—that we had to utilize the machine immediately for work at hand."

The design, development, and final construction of GEORGE took three years of coordinated effort on the part of Argonne's mathematicians and engineers. The cost was approximately $303,000, about one sixth of comparable commercially produced machines. This figure, however, does not include developmental work and time spent by regular salaried laboratory personnel.

The design and early phases of construction of GEORGE were initiated by three former members of the Argonne staff, J. C. Chu, Raymond F. Kramer, and Jean F. Hall. Dr. Chu was in charge of the design and construction of AVIDAC, Argonne's first high speed computer. During World War II Chu was an engineer on the design and construction of ENIAC which was built at the University of Pennsylvania and was the first all-electronic digital computer ever constructed.

Four members of Argonne's Electronics Division were responsible for the final phases and construction of GEORGE They are Loren R. Collins, David H. Jacobsohn, Stanley C. Hanson, and Thomas Brill, who is the Electronics Division's director.

A problem for GEORGE generally originates with one of the Laboratory's scientists who proposes the particular situation to be attacked to Argonne mathematicians. An analysis to reduce the problem to a precise mathematical form is then carried out. Next the mathematicians decide upon a "program" of instructions for the computer. This program is a detailed set of orders which determine step by step what operations the machine must perform.

The program of instructions, along with any numerical data relevant to the problem, is punched in coded form on a paper tape. (This resembles the punched paper tape used by a teletype machine.) The punching process is carried out on auxiliary equipment not directly coupled to GEORGE.

The program and data are "read into" the computer by passing the punched tape through a photo-electric reader. With everything set up, GEORGE can then proceed automatically from order to order.

The machine may be instructed to automatically repeat a portion of its instructions for each of several different numbers that are read into it. It may be ordered to skip a part of the instructions if a certain condition is satisfied, but to continue on to the next order if that condition is not satisfied.

GEORGE will operate automatically, skipping and repeating orders where necessary, until the instructions that have been read into it are satisfied. (The process of repeating orders is called a "loop.") Results come out on coded paper which can be run throuh an especially altered electric typewriter which prints them in tabular form.

GEORGE was based on the older AVIDAC, which has been retired from service, but has an improved type of electronic memory with speedier access to stored information, greater information capacity, and less possibility of mechanical error. It is also a two-address machine, meaning that an instruction can refer to two different locations of

data in the memory and can use one of these locations more than once.

The new computer uses the binary arithmetical system as opposed to the standard decimal system. Each of the tiny magnetic cores in its memory can distinguish between "1" and "0." Any number can be expressed in this computer language. The number 37 in the decimal system, for example, is expressed as 100101 in the binary system used by GEORGE.

GEORGE can handle 4,096 numbers (termed "words") of 40 binary units, or "bits," each equivalent to about 12 decimal digits, in its ready-access core memory.

Projected for installation with the computer in 1958 is an auxiliary memory unit, consisting of four wide magnetic tapes each of which will carry 42 columns or tracks of data. This memory will have a four million word capacity which can be doubled by the addition of more tapes and recording-playback units. The auxiliary tape memory unit of GEORGE will be similar to a unit built by Argonne for installation with ORACLE, a computer at the Oak Ridge, Tenn., Institute for Nuclear Studies.

The computer is a complex arrangement of parts, with 3,500 electronic tubes, 3,000 diodes (crystals), 20,000 resistors, 1,000 condensors, and ten miles of electrical wire. The ready-access memory, with its switching equipment, has 182,784 magnetic cores.

To keep parts from overheating during operation, the computer has enough air conditioning equipment to cool 15 homes.

An overflow stop allows GEORGE to suspend operation when the machine encounters a number that is out of the range of its capacity. A feature of GEORGE to be added during 1958 will be a "floating point" mechanism, allowing the machine to automatically handle numbers of widely varying size.

The magnetic core memory of GEORGE built to Argonne specifications, is one of four similar memories for computers built by the Telemeter Magnetics, Inc., Los Angeles. Other memories of this type are in use with computers at the Rand Corporation, Santa Monica, California; the U.S. Army Proving Grounds, Aberdeen, Maryland; and the Chaim Weitsmann Institute, Israel.

Multiplication and division are automatically reduced to a sequence of additions by the machine. A complex problem involving thousands of multiplications and divisions can be done in a few minutes.

Two uses of GEORGE and other electronic computers are envisioned by Argonne scientists.

One is the mathematical simulation of an actual experiment or piece of experimental equipment in operation, such as what happens during the operation of a new atomic reactor. The other is in analysis and interpretation of experimental data, a time-consuming and error producing process by hand methods. Experimental equipment can be adapted to record results directly on punched paper tape for interpretation by GEORGE.

One example of a situation where GEORGE is helping Argonne scientists and engineers is in the planning of a huge new machine, called a "particle accelerator," which will produce sub-atomic particles accelerated to a tremendous speed. One way to design this machine would be to build components, such as the magnets which control the paths of the particles, and test them out —but this process would be costly and time-consuming. With the computer it is possible to figure out theoretically what magnets of a certain design do to sub-atomic particles and, by process of elimination, to find the best magnet design.

Another new electronic digital computer, an IBM model 704, is joining GEORGE in the Applied Mathematics Division's offices in the Argonne Physics Building.

Concrete Institute Set

The Annual Convention of the American Concrete Institute will be held Feb. 24-27, 1958, at the Morrison Hotel, Chicago. This 54th meeting of ACI will encompass many varied discussions on the technical aspects of concrete and concrete construction according to A. Allan Bates, MWSE, vice-president of the Portland Cement Association and general chairman of the Chicago convention committee.

One full day, Monday, Feb. 24, will be devoted to "working sessions" of ACI technical committees. Tuesday will feature two general sessions, one on proposed ACI Standards, the other on the construction of the St. Lawrence Seaway.

Wednesday, Feb. 26, will see concurrent sessions on fatigue of concrete, concrete construction, structural design, and the design and construction of highway pavements.

The annual research session will headline the activities on Thursday with a tour of the Portland Cement Association laboratories topping off the day.

Though you had a Cool Yule

Don't keep that prospect on ice!

Do you have five friends?

If you do and if they are interested in engineering they belong in Western Society.

When you receive your packet of five proposal cards, write down the names and addresses of these five friends. Drop the cards in your "out basket" and that is all there is to it.

We plan to use the technical sessions as the kick-off for the drive in each section. A few weeks after the technical session a packet of proposal cards will be mailed to each member of the section. We ask you to fill the cards out the day you receive them. You don't have to ask these men. You don't have to interest them in joining WSE. You don't even have to be sure that they are not members already. All you have to do is send in their names and addresses. If two of you should send in the same name or if the prospect is already a member, the WSE staff will cull these names out. With 3,000 members and 15,000 proposal cards *we can gain 1,500 new members.*

This year your Membership Committee is organized to launch a membership drive on two fronts. First, we are recruiting new members from among the acquaintances of present members. The success of this phase of the drive is up to you. Second, we are recruiting new members from a canvass of companies which employ engineers. This phase of the drive is being handled by subcommittees of the Membership Committee. The Membership Committee chart you see on the adjoining page tells the story. If you know of a firm which should have members in WSE, please send us the name and address of the firm and if possible someone to contact there.

ORGANIZATION OF MEMBERSHIP COMMITTEE
Western Society of Engineers
1957-1958

CHAIRMAN
W. T. Larner
Ill. Bell Tel.
208 Washington
OF 3-9300 X3322

VICE-CHAIRMEN

W. G. Fulton
Ill. Bell Tel.
208 Washington
OF 3-9300 X4419

L. R. Asplund
Ill. Bell Tel.
208 Washington
OF 3-9300 X4825

CONSULTANT AND GENERAL CONTACTS
O. W. Eshbach
Northwestern Technological Inst.
Evanston, Ill. UN 4-1904

Board Member:
V. E. Gunlock

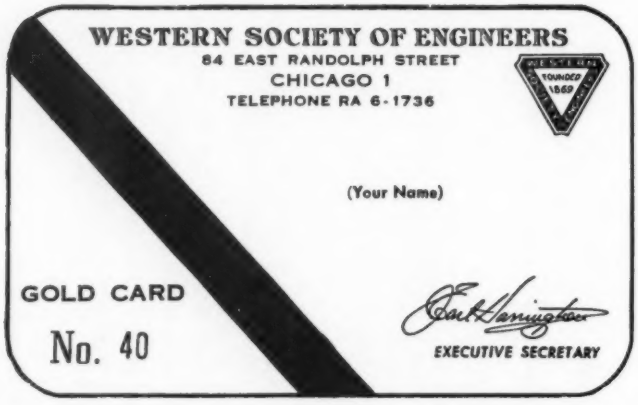
Members Ex-officio:
President and officers of WSE
Board of Direction
Officers of all sections

SUB-COMMITTEES

- Ill. Bell Telephone, AT&T, and small utilities
  - R. E. Smith, Ill. Bell Tel., Mdse. Mart, SU 7-9980 X344
  - D. J. Nankervis, General Meters and Controls, 205 W. Wacker, AN 3-7050
- Western Electric, Teletype, Peoples Gas, and large utilities
  - E. W. Deinert, Peoples Gas, 45 E. Pershing Rd., WA 2-6000
  - C. M. Nessel, Western Electric, 4516 Wolf Rd., Western Springs, CH 6-2567
  - L. A. Marconi, J. S. Adams Co., 767 Milwaukee Ave., HA 1-1467
- Consultants and Services
  - J. F. Cascino,
  - B. H. Cutler, Muncie Construction Corp., Box 1032, Muncie, Indiana
- Small Manufacturers
  - M. L. Butter, Precision Transformer Corp., 2218 W. Lake St., SE 7-2740
  - E. Knieriemen, DuBois Engineering and Mfg. Corp., 2600 E. 169th St., Hammond, Indiana
  - J. E. Drapeau, Glidden Co., 1717 Summer, Hammond, Indiana
- Large Manufacturers
  - J. R. Wessling, Allen-Bradley Co., 445 N. LaSalle St., WH 4-1670
  - H. J. Fass, Am. Card and Foundry Industries, Inc., 336 Woodward Rd. S.E., Albuquerque, N. M.
  - T. L. Dahlberg, Deady Chemical Co., 53 W. Jackson Blvd., HA 1-1461
- Municipal and Metropolitan Agencies, Government agencies
  - J. Jones, Peabody Southern Coal Co., Prudential Plaza, ST 2-3800
  - R. S. Terhune, Nelson Electric Mfg. Co., 333 N. Michigan Ave., ST 2-7169
- Section Membership Representatives
  - Bridge—H. H. Sonderegger, BO 8-8100
  - Chemical—R. H. Seffens, FI 6-1800
  - Communications—T. W. Wigton, WA 2-2345
  - Electrical—P. J. McLaughlin, AU 7-6781
  - Fire Protection—S. V. Sramek, FR 2-7300
  - Gas, Fuels and Combustion—D. J. Nankervis, AN 3-7050
  - Hydraulic—D. F. Reinert, CE 6-1034
  - Mechanical—
  - Traffic—S. A. Yexley, RA 6-1200 X-3536
  - Transportation—M. Pikarsky, WA 2-2612

ESPECIALLY FOR YOU WHO VALUE FINEST CLUB SERVICES

... (at no extra charge) ...



We offer the use of GOLD CARD charge for your convenience. You have long appreciated the tastefully distinctive atmosphere of Western Society's lounge and dining room. Now to add to that enjoyment, we have available a service whereby you may sign for the excellent food and beverages served.

Monthly statements are issued for which no charge is made except that a minimum monthly amount of $10.00 must be maintained through use of the lounge and/or the dining room.

Members who operate their own businesses or have expense accounts will find the GOLD CARD service a particular advantage since a complete record of expense is provided together with house checks to back this record.

Why not take full advantage of Western Society's facilities for business and professional entertainment through use of our GOLD CARD service so that you may sign house checks in the lounge or dining room?

CHAIRMAN, HOUSE COMMITTEE,
WESTERN SOCIETY OF ENGINEERS,
84 EAST RANDOLPH STREET, CHICAGO, ILLINOIS

Please send me a gold membership card that will permit me to sign for house checks at the bar and dining room. It is my understanding that the minimum billing for such an account will be $10.00 a month. It is also my understanding that this arrangement will be on a till forbid basis and may be cancelled at the end of any calendar month on 30 days prior notice in writing.

NAME (PRINT)_____

ADDRESS_____

_____

_____
(SIGNATURE)

Add any special billing instructions here:

_____

_____

_____

Lake Diversion

(Continued from Page 5)

ther raise the levels of the Great Lakes and more than compensate for the proposed temporary diversion of 1,000 c.f.s. at Chicago.

The Government of Canada invited the Government of the Province of Ontario and the Hydro-Electric Commission of Ontario to submit Briefs presenting their opposition to the proposed temporary diversion from Lake Michigan at Chicago. These Briefs were introduced into the Congressional Record (pages 14482 to 14485) by Senator Wiley of Wisconsin on August 26, 1957.

On the matter of increasing Canada's diversion into Lake Superior the Briefs as submitted were as follows:

The Brief of the Government of the Province of Ontario stated:

> "It has been suggested by some of the supporters of water diversion from Lake Michigan into the Illinois Waterway that the Province of Ontario might counteract any adverse effects of such diversion by increasing the Long Lac-Ogoki flow into Lake Superior. Our engineers advise us that such an increase is not possible, however, *since virtually all the inflow from the Albany River system is being diverted to the south.* The present flow is approximately 5,000 cubic feet per second and Ontario regrets that *there is no way in which this can be increased.*"

On the same phase, the Hydro-Electric Power Commission of Ontario's Brief states:

> "It is not possible to compensate for the increased diversion at Chicago by diverting additional flow into Lake Superior by way of the Long Lake and Ogoki Diversions, as all flow that can be so diverted is being diverted."

The statement in the Province of Ontario's Brief that "virtually all of the inflow of the Albany River is being diverted to the south" is factually misleading. The Albany River is one of the largest Rivers in Canada, and maps indicate that about 6,000 square miles of its upper watershed drain to a point about 120 feet higher than the Ogoki River pool, from which water is diverted into Lake Superior. A statement that "virtually all of the inflow of the Ogoki River is being diverted to the South," would be correct; and this may be what the author of the Brief really intended to state but did not do so.

While the Brief of the Province of Ontario, as above quoted, states their engineers advise that an increase of diversion as suggested into Lake Superior is not possible, may we respectfully offer the following action as a possibility of Canada's increasing such diversion into Lake Superior.

The capacity of the existing diversion works, from the Ogoki River to the Jackfish River, then Lake Nipigon and into Lake Superior is about 10,000 c.f.s. At present it is quite probable that all the water divertable from the Ogaki River watershed is being thus diverted.

However, the watershed of the upper Albany River, above Rat Rapids, including Lake St. Joseph (elevation 1,172) is approximately 6,000 square miles in area and should yield about 5,000 c.f.s. of water.

A dam 40 feet high could raise the water level of Lake St. Joseph to elevation 1.200 or about 127 feet higher than the level of the Ogoki River Pool. This difference in levels should be sufficient to cause of flow of 5,000 c.f.s. from the Albany River Pool, through a proper cut through the Albany-Ogoki Divide. Canadian maps indicate a low place in this Divide on the line between Rat Rapids (on the Albany River) and Pike Lake (on the Ogoki River).

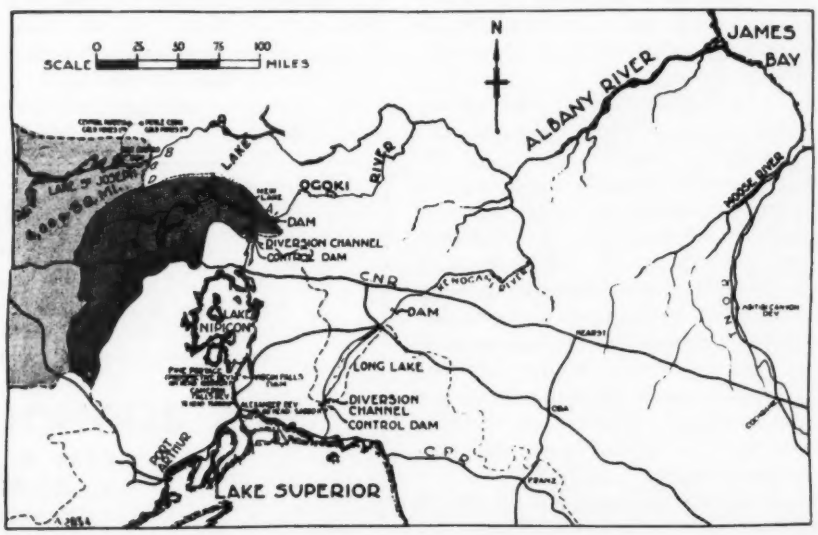
I believe that this suggested avenue of possible additional diversion from the Albany River into the Ogoki River and thence into Lake Superior merits thorough investigation and serious reconsideration by Canada. I urge, therefore, that the conclusions of the engineers of the Government of the Province of Ontario, that a further increase of diversion into Lake Superior is not possible, be reviewed.

It has been a sincere pleasure for me to here discuss the matter of diversion before this Western Society of Engineer's meeting.

After all these problems are not solely ours, who happen at the moment to be serving in an official capacity, but they are your problems too, and the problems of the general public. We know, however, we can look to your Society for cooperation and advice and that the problem of diversion will eventually be solved.

New Phone System

An internal private-branch telephone system is going into operation in England, that is noiseless, has no moving parts to go wrong, and will last up to 50 years, according to *Product Engineering*. The complete unit is contained in a box only 20½ inches long, 19 inches high and 12 inches deep. But into this box are crammed more than 1,000 components, including 74 electronic tubes of a revolutionary type, that eliminate moving switches, and a memory that holds incoming calls until its line is free, then puts them through.



Diversion map for Ogoki and Albany rivers

Opinions Given on Liberal Arts Courses

The lack of liberal arts courses in the curricula of engineering schools is handicapping the advancement of graduate engineers in industry. This is the opinion of four executives of engineering companies questioned by *Product Engineering.*

Oscar G. Burch, vice-president of research and engineering, Owens-Illinois Glass Co., had this to say:

"In the basic sciences and various engineering studies, recent graduates are as proficient, if not more proficient, than those of past years. In general, however, we find that engineering graduates are deficient in at least three aspects: They are unable to get their ideas across to management in a concise, understandable manner either orally or in the form of written reports. This indicates a lack of training in English. Their ideas of economics and general business are most inadequate and, they have a very limited background in the arts. This results in their having difficulties in industry in the general field of human relations, particularly with other departments of their own companies."

John H. Grenning, chief engineer, Micromatic Home Corp., made the following comment:

"The man graduating from engineering school today is better trained in the sciences and humanities than his predecessors. However, because of the intensity of the recruiting effort by certain organizations, his adjustment to the realities of industrial life is made more difficult."

From William A. Ray, president and chief engineer, General Controls Co., came the following:

"Automatic control companies and others manufacturing highly-engineered products will be more successful if their top management is cultivated from broadly experienced men with a strong engineering background. Granting this, we feel recent engineering graduates, as a whole, have not received sufficent academic training in such management requirements as finance, law, marketing and sales, in conjunction with their engineering training."

Dr. Lester C. Van Atta, technical information and education, Hughes Aircraft Co. said:

"College graduates, generally, and particularly graduates of engineering curricula, too often are weak in the fundamental concepts of science and mathematics, and lack facility in advanced mathematics techniques. They often are unable to write or speak clear, concise English, or even to read with precise understanding, and are not well versed in economics, politics, history and other liberal arts subjects."

A suggestion, made by two of the executives, referred to the trend towards extension of the four-year undergraduate course in engineering to five years. Examination of this practice indicates that in most cases, the additional year is devoted to further training in technical subjects. It would be much more profitable, they felt, to use the equivalent of this year, for introducing more liberal arts subjects into the five-year engineering curriculum.

Mechanical Engineers Gather in New York

Seven thousand engineers and others concerned with new developments in nuclear energy, high-speed aircraft, automation, gas turbines and other fast-growing technical fields began gathering in New York on Dec. 2 at the Hotels Statler and Sheraton-McAlpin for the largest meeting every sponsored by The American Society of Mechanical Engineers.

More than 400 technical papers, speeches, symposia and other events were crowded into the five-day event which ended on Dec. 6. On most days, as many as 15 simultaneous sessions ran from 9:30 a.m. to 10:30 p.m. in order to cover the vast amount of technical information being made public.

In addition to exchanging information on technical achievements, the engineers discussed methods of improving the organization and efficiency of America's technical specialists, a topic given new importance by the nation's current effort to retain technological superiority. On Dec. 2 retiring Society President William F. Ryan discussed the responsibility of engineers of assuring the growth of the profession. Later in the day members heard a progress report on a new $10,000,000 United Engineering Center to be built opposite the United Nations in New York to house headquarters of key technical societies, including ASME.

On Dec. 3, a speech originally scheduled for delivery by Lewis L. Strauss, chairman of the U.S. Atomic Energy Commission, was delivered in his name at a luncheon meeting at the Hotel Statler.

Also on Dec. 3 Joseph B. Johnson, governor of the State of Vermont, and a member of ASME, delivered the Society's annual Roy V. Wright Lecture on "Engineers in Civic, Public and Political Life."

Other features of the meeting, in addition to technical sessions, was a banquet address on Dec. 4 by Henry T. Heald, MWSE, president of the Ford Foundation and a dinner speech on Dec. 5 by Francis K. McCune, vice-president and general manager of General Electric Company's Atomic Power Division, on "History and Scope of the Nuclear Power Business."

Throughout the meeting special emphasis was placed on a program designed to acquaint engineers with the current status of the American nuclear power industry.

On Dec. 5 and 6 there was a series of sessions at which nearly 100 technical papers on the general subject of lubrication, originally presented in London, England two months eariler, was re-presented for an American audience.

During the meeting a new slate of national officers, headed by 1958 President James N. Landis of San Francisco, was installed.

Electronic Frequency Standard Perfected

The Hamilton Watch Company's Instrument Division has announced in Denver, Colo. that it has perfected a miniaturized, transistorized electronic frequency standard which now permits the development of highly accurate miniature timing systems in a wide range of fields.

D. J. Jones, vice-president in charge of the Hathaway Instrument Division of Hamilton, said that the frequency standard—utilizing a new type of miniaturized electronic tuning fork—has "an almost limitless application in our highly technical and accurate scientific world. We are ready to meet the requirements for developing, designing and manufacturing new and miniaturized electronic frequency standard systems."

Some of the more important systems in which the frequency standard can be used are aircraft and missile guidance systems, aviation power generators, radar, nuclear counting, high speed photography, ballistics measurements, and geophysical time reference.

Jones said that the new development makes it possible to calibrate and divide time so precisely that it would take months to accumulate an error of only one second.

The ultra precise component, with an associated advance in transistor circuitry, will manage frequency under most environmental conditions confronting the military and industry today. It will perform accurately at temperatures well above 100 degrees Centigrade.

The fork is a bi-metallic, temperature compensated primary source of frequency. Laminated of nickel steel and carbon steel, the tuning fork is rugged, simple to operate and maintains excellent stability under temperature variations or external influence.

General Telephone To Invest 200 Million

"General Telephone System will invest $200,000,000 (200 million) in 1958 for expansion of facilities throughout the system," Donald C. Power, president of General Telephone, said Oct. 17 in dedicating the new manufacturing and research facilities of Automatic Electric Company at suburban Northlake (Chicago), Ill.

"Communications is the key to progress in this era of growth and expansion. Every working day, in 1958, General Telephone will spend a million dollars a day in the forward progress of our company."

"In 1958, General Telephone will have gross revenues of nearly $500,000,000" Mr. Power said. "Our total plant investment has already passed the billion dollar figure in 1957. Within five years we plan to more than double this figure."

Before several hundred invited business and industry guests, Power formally dedicated Automatic Electric's new plant by dialing its telephone number which set off electronic impulses which took the place of the usual ribbon cutting.

Also taking part in the dedication ceremonies were Leslie H. Warner, executive vice-president of General Telephone System in charge of its manufacturing units, and Herbert F. Lello, president of Automatic Electric.

Rubidium Chemicals Are in Production

American Potash & Chemical Corporation has begun production of a series of rubidium and cesium chemicals, according to an announcement by Daniel S. Dinsmoor, Vice President in charge of Planning and development.

This is the first time rubidium salts have been manufactured in sizable quantity in the United States. Previously, the world supply has amounted to only a few hundred pounds per year.

Dinsmoor said the company hopes to encourage industrial applications for both rubidium and cesium compounds by offering a steady source of supply and by pricing the chemicals in a range that makes their wide commercial use feasible.

AP&CC is producing the carbonate, sulphate, chloride and fluoride compounds of both cesium and rubidium, and plans to offer additional compounds in the future.

Present uses for rubidium and cesium include such applications as the manufacture of specialty glass, in photocells used in automatic controls and in chemical processes. They also find use in electrical and radio engineering, manufacturing of vacuum tubes and X-ray equipment, certain medical uses and specialized optical applications. Both chemicals are under study for use in atomic energy applications.

Lithium ores from Bikita, Southern Rhodesia, Africa, are processed at San Antonio, Texas, plant of AP&CC's subsidiary, American Lithium Chemicals, Inc., with lithium hydroxide the primary product. End liquors from the lithium hydroxide plant are processed into a mixed alkali salt, Alkarb, at another AP&CC subsidiary, San Antonio Chemicals, Inc., also located at San Antonio. Alkarb is composed of the carbonates of potassium, rubidium, cesium, sodium and lithium.

The mixed carbonates now are being processed further to obtain the rubidium and cesium salts, marking another step in the upgrading program.

Professional Directory

U. S. FIRE PROTECTION ENGINEERING SERVICE, INC.

Chicago • Kansas City • San Francisco

Specialists in — FIRE • Control Construction • Prevention Methods • Protection Equipment

CONSULTANTS — DESIGNERS

Chicago Office — 53 W. Jackson Blvd. Tel. WEbster 9-3358

DE LEUW, CATHER & COMPANY

CONSULTING ENGINEERS

Public Transit	Subways
Traffic & Parking	Railroad Facilities
Expressways	Industrial Plants
Grade Separations	Municipal Works
Urban Renewal	Port Development

150 North Wacker Drive, Chicago 6

San Francisco Toronto Oklahoma City

◆

ROBERT W. HUNT COMPANY
ENGINEERS

Inspection • Tests
Consultation
•
Engineering Materials
•
Cement • Concrete • Chemical
Physical and Metallurgical
Laboratories

175 W. Jackson Blvd., CHICAGO, And All Large Cities

SARGENT & LUNDY

ENGINEERS

140 S. DEARBORN STREET

CHICAGO, ILLINOIS

SILAS CARTLAND P.E.

Consulting Engineer
Designer

Air Conditioning
Mechanical & Electrical
Systems for Buildings

911 Busse Hiway, Park Ridge
Ta 3-1300

E. R. GRITSCHKE
and
ASSOCIATES,
Incorporated

Consulting Engineers

Designers of
MECHANICAL and ELECTRICAL SYSTEMS for BUILDINGS

11 S. LaSalle St., Chicago 3, Ill.

◆

SOIL TESTING SERVICES, Inc.

Consulting Engineers

John P. Gnaedinger
Carl A. Metz

Soil Investigations,
Foundation Recommendations and Design,
Laboratory Testing

1827 N. Harlem Avenue, Chicago 35, Illinois
Milwaukee, Wisconsin - Portland, Michigan
Kenilworth, N. J. - San Francisco, California
Havana, Cuba

◆

JENKINS, MERCHANT & NANKIVIL

Consulting Engineers

Municipal Improvements	Sewerage
Power Development	Water Systems
Traffic Surveys	Industrial Plants
Flood Control	Recreational Facilities
Airports	Investigations and Reports

805 East Miller Street
Springfield, Illinois

ESTABLISHED 1913

WALTER H. FLOOD & CO.

CHEMICAL ENGINEERS

Inspection and Testing
Of Materials and Structures
Buildings, Roads, Streets, Airports
SUPERVISION OF CONSTRUCTION
CONCRETE CORE CUTTING
6102 S. BLACKSTONE AVE. CHICAGO 37
Branch—1332-4 N. Westnedge Ave.
Kalamazoo 53, Mich.

Your Card* on this or the opposite page will acquaint others with your specialized practice.

* Restricted to Professional Architects and Engineers

Professional Directory

JOHN F. PARMER
Engineers

Designing — Structural System
Consulting — Industrial Bldgs.
Investigations — Foundations
Reports — Pavement
Supervision — Bridges

173 W. Madison St. — Chicago 2
FRanklin 2-4198

✦

Battey & Childs
ENGINEERS
231 So. LaSalle Street
Chicago 4, Ill.

INDUSTRIAL PLANTS
POWER PLANTS
REPORTS

DESIGN — SUPERVISION

GREELEY AND HANSEN
ENGINEERS

Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal
220 S. STATE STREET, CHICAGO 4

STANLEY ENGINEERING COMPANY

Consulting Engineers

Hershey Building — 208 S. LaSalle St.
Muscatine, Ia. — Chicago 4, Ill.

Chas. W. Cole & Son

Engineers & Architects

South Bend, Indiana

A. A. Lipsey & Associates
ENGINEERS

Structural Design
Industrial Buildings
Commercial Buildings
Foundations
Investigation
Reports — Appraisals

21 E. BELLEVUE — CHICAGO 11
WHitehall 4-3298

Alvord, Burdick & Howson

ENGINEERS FOR

Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation

20 N. Wacker Drive • Chicago 6

Telephone: CEntral 6-9147

VERN E. ALDEN CO.
Engineers

Design and Supervision of Construction

Industrial and Chemical Plants
Steam Power Plants

33 North LaSalle St.
Chicago 2

HAZELET & ERDAL

Consulting Engineers

Bridges — Foundations
Expressways — Dams — Reports
Monadnock Block
Chicago

403 Commerce Bldg., Louisville
Dixie Terminal Bldg., Cincinnati
Oding Bldg., Lansing

LESTER B. KNIGHT & ASSOCIATES, Inc.

- Management Engineering
- Industrial and Plant Engineering
- Architectural Engineering

CHICAGO NEW YORK WASHINGTON, D.C.

✦

Your Card* on this or the opposite page will acquaint others with your specialized practice.

* Restricted to Professional Architects and Engineers

Engineering Societies Personnel Service, Inc.
Est. 1918

Chicago	Detroit	New York	San Francisco
84 E. Randolph St.,	100 Farnsworth Ave.,	8 W. 40th St.,	57 Post Street
ST 2-2748	TE 3-1090	WI 7-5878	SU 1-5720

The following items are furnished by the Engineering Societies Personnel Service, Inc., a non-profit, self supporting, personnel service sponsored by W.S.E., A.I.E.E., A.I.M.E., A.S.C.E., A.S.M.E., S.N.A.M.E., E.S.D., E.C.S.F. Replies should be addressed to the nearest office.

Members of the societies shown above may publish a free advertisement on this page by registering at the nearest E.S.P.S. office. A weekly bulletin of Positions Open is available by subscription at $3.50 a quarter for members and $4.50 a quarter for non-members.

PLACEMENT FEES: The service is operated on a co-operative basis, whereby those actually placed in positions by the Service pay a fee in accordance with the established placement fee rates, which is 4% of the annual salary to members and 5% of the annual salary to non-members. HOWEVER MANY EMPLOYERS EITHER PAY FULL PLACEMENT FEE OR NEGOTIATE FEES.

POSITIONS AVAILABLE

C-6576 SALES ENGR. Grad. EE-des. age to 35; 5+ yrs. in sales work. Knowl. of electronics & Govern.Specs. To call on engrg. & purchasing depts. of O.E.M.'s, motor mfgrs., guided missile electronic & computer companies selling transistors. Good personality 25% travel home week ends, car furnished for a mfgr. of electronic eqpt. sal. $8-10,000 loc. Chgo. employer will pay the fee.

C-6578 ASST. to TRADE ASSOC. SEC'Y. Grad.Mech.Rec.grad. to 5 yrs. exp. knowl. of htg., vent. & piping. Duties: Asst. to sec. prepare tech literature, work with mfgrs. set up committee educational programs, etc. Must be draft exempt. Good personality & ability to meet & work with others for a trade assoc. sal. $5700-8000 dep. on exp. loc. Chgo. employer will pay the fee.

C-6580 PROJECT ENGR. Grad.EE age 35+; 5 yrs. in design & installation of heavy elect. design. Duties: Project engr. in office & field designs, layout, & installation of heavy elect. eqpt. in indus. plants. Should be able to handle purchasing of motors, eqpt., wiring fittings, etc. Ability to talk to clients for a consultant sal. $4-4.25 hr. loc. Chgo. employer will pay the fee.

C-6585 MACHINE DESIGNER BSME age to 33; 5 yrs. exp. in actual design work. Duties: Personable & neat appearing man to do machine design work on a variety of machines from delicate to heavy for a mfgr. of surgical sutures sal. $500 mo. loc. Chgo. employer will pay the fee.

C-6591 SALES ENGR. Grad.Engr. age 28-35; should be mechanically inclined & some sales exp. Duties: Will go thru a training period in company's general office, when this is completed will be assigned to a territory for a mfgr. of shovels, cranes, draglines, etc. sal. $5-600 dep. on exp. loc. Chgo. employer will pay the fee.

C-6592 ASST. TO SALES MGR. EE or Mech. age to 35; 3+ yrs. selling process instruments & controls. Duties: Asst. to Sales Mgr. act as liaison between engrg. & sales depts. All inside sales, must be good organizer for a mfgr. of instruments & controls sal. $7500-10,000 loc. Chgo. employer will pay the fee.

C-6593 JR. MECH. DESIGNER Grad.Mech or equiv. 2+ yrs. in designing semi heavy equ. Duties: All design work on the board-on coal & ore handling eqpt. Must have good imagination for a consultant sal. $500-550 dep. on exp. loc. Chgo. employer will pay the fee.

C-6595 BRANCH OFFICE MGR. Some EE or ME: age to 50; Duties: To operate district office-contacting utilities & industrials on central station & high voltage eqpt. Must be free to travel sal. $10,000- bonus on sales loc. Minn. employer will pay the fee.

C-6596 CHEMICAL ENGRS. & PHYSICISTS BS or better, age 30-50; 5+ yrs. in one of the following: (A) Adhesives & flexible plastic (B) Formulation of printing inks, (C) Optics, electronics & color for printer sal. $7-850 loc. Chgo. employer will pay the fee.

C-6600 HYDRAULIC & SANITARY ENGRS. Grad.Engrs. age 30-40; 2+ yrs. in flood control, drainage, struct. des. or sanitary engrg. know engrg. & tech. writing. Duties: Assist in the preparation of tech. literature on dams, flood control, culvert & drainage structures or sanitary, water & sewage plants. Make inspect. of projects under construction and assist field force in promoting use of concrete for project. Must have good personality, travel, sal.open. Loc. Chgo. employer will pay the fee.

C-6609 PLANT ENGR. some college; age to 45, 3 yrs with air cond.mfgr. know commercial & residential refrigerating & air cond. eqpt. Duties: Complete charge of maint. function, some estimating, cost reduction plant layout, ind. engrg. in methods. for a mfgr. sal. $614-800 loc. Chgo. Employer will negotiate the fee.

C-6613 DRAFTSMAN 2+yrs. in general mech. drafting. Duties: Prepare proposal drawings & sketches for sales dept. for mfgr. of heavy eqpt. similar to construction eqpt. sal. abt. $90-95 wk. loc. Chgo. employer will pay the fee.

ENGINEERS AVAILABLE

845-MW: MECH. ENGR. (chem. or petroleum) 32 BSME 7 yrs. process piping design including pipe stress analysis, valve, pump & eqpt. selection $650 Chgo.

846-MW: PLANT SUPT. INDUSTRIAL ENGR. (metal mfg.) 54 BSME; 11 yrs. experience as plant supt. 5 yrs. as industrial engr. 10 yrs. in design & devel. of tools $10,000 Chgo. area.

847-MW: ADMIN. ENGR. & MANAGEMENT (mech.eqpt.) 36 BSBA-Assoc. in EE MSBA 2 yrs. management, 5 yrs. sales, 3 yrs. admin. sales dept., refrigeration air conditioning, heating & air moving machinery industry. $9500 Chgo.

848-MW: SUPERVISORY DIRECT SALES-TECHNICAL CONTROLLER (chem. or petroleum) 42 BS-Chem.&Bact. MS-Mrkt.Mgmt. Chemistry, marketing mgmt. survey work in marketing, naphthas & solvents, aliphatic & aromatic $12,000 Chgo. or West Coast.

Electronics Industry Must Multiply 20-Fold

"The electronics industry must multiply its past progress ten or twenty-fold to keep up with rapidly increasing responsibilities placed upon it by society."

This was stated in Chicago, Oct. 7 in a luncheon address to the National Electronics Conference by Dr. Harold V. Gaskill, vice president for planning, Collins Radio Co.

"Though the industry has been doing a tremendous job so far, it cannot rest on its accomplishments to date," Gaskill continued.

He cited the fields of communications, data processing, air navigation, and national defense as representative areas in which the electronics industry must "constantly readjust to live up to its past record and the world's increased demands for improvement."

Though Gaskill believes that the industry already has "come of age," he specified that they must continue their fine record to have the goods when they are needed, not after they are required.

WSE Nominating Committee Appointed

To the Corporate Members:

I am pleased to announce that in accordance with Article X, Section 3, of the Constitution, the Board of Direction has appointed a Nominating Committee as follows:

George L. Jackson (Board Member)
John G. Duba
Ovid W. Eshbach
William V. Kahler
Marvin V. Maxwell
Ralph G. Owens
H. P. Sedwick

The Constitution also provides that suggestions for nominees shall be solicited in the publications of the Society.

J. EARL HARRINGTON
Executive Secretary

Tear off and Return

To the Nominating Committee:
Western Society of Engineers:

I suggest the following names for consideration by your committee for offices indicated.

Officers and Trustees

President .....
1st Vice Pres. .....
2nd Vice Pres. .....
Treasurer .....
Trustee (eight to be nominated)
1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....

Members of Washington Award Commissions

Past Pres. of WSE. .....
Member not a Past Pres. or at present a member or the Board or candidate thereof .....
Signed .....
Address .....
Date .....

Reviews of Technical Books

Technical Report Writing

Technical Report Writing, by James W. Souther, John Wiley & Sons, New York, 16, N.Y. 1957. Pages, 70. Price, $2.95.

Technical Report Writing is a concise briefing on how to prepare functional engineering and scientific reports.

Short and to the point, *Technical Report Writing* follows all the fundamentals of this craft from the process of assignment to the finished written product. A design approach, by which the principles of engineering design are translated into written terms, is applied to the solution of writing problems.

An early chapter on analysis of the writing situation tells how to determine the purpose, the industrial use, and the audience of the report. Mr. Souther then considers investigation of the writing problem, advising how to formulate a plan of attack, how to gather the necessary material, and how to evaluate it. Design is the next phase covered, with tips on the functional organization of the report itself, the questions of deciding what material is to be included, and the order in which it is to be presented. In a final chapter on the application of the design, the author specifies how the report is to be written, and includes details on checking, modification, and preparing final copy.

Such subjects as report form, abstract writing, technical style, and illustrations are introduced at the point where they would logically enter the writing picture. The appendix is reserved to a check sheet which lists all the questions a finished report should answer; mechanics (abbreviations, numbers, equations, and documentation); reproduction processes; and a sample report.

Associate professor of humanistic and social studies and assistant dean of the college of engineering at the University of Washington, Mr. Souther has also developed and conducted technical writing courses both in educational centers and industrial organizations.

Resistance of Materials

Resistance of Materials, Fred B. Seely and James O. Smith, John Wiley & Sons, New York 16, N.Y. 1956, fourth edition. Pages, 439. Price, $6.50.

The traditional treatment of the subject, based on the assumption of elasticity, has now been extended to include the effects of inelastic behavior on the strength of a member. In this way, the theory of resistance of materials is made more self-sufficient, and it is possible to develop more rational methods of analyses and design, necessary to study the wider range of conditions met in engineering practice.

The theory of inelastic behavior is utilized from the start—in the first chapter ("Relation among Loads, Stresses, and Deformations"), it obtains a correct and simpler analysis of riveted and welded parts, and in the revised chapter on columns, the theory serves to understand the effects of inelasticity on buckling strength. The authors also provide a more realistic concept of safety of a member, and introduce the use of interaction curves as a means of solving problems that involve combined loads, particularly where inelastic behavior of the member is involved. New figures and problems, emphasizing actual physical conditions, are consistent with this and other new material.

Additional chapters include: torsion of cylindrical bars; bending loads and stresses in beams; deflection of beams; combined axial tensile and bending loads; statically indeterminate members; relations between stresses at a point on different planes passing through the point, and combined static loads; repeated loads and fatigue of metals; dynamic loads; composite beams and reinforced-concrete beams; unsymmetrical bending; double-integration method for deflection of beams; conjugate-beam method for deflection of beams; continuous beams and three-moment theorem; and elastic vibration of load-resisting members. Two extensive appendixes cover properties of an area and properties of rolled-steel sections.

Fred B. Seely is emeritus professor of theoretical and applied mechanics, University of Illinois. He is co-author with N. E. Ensign of *Analytical Mechanics for Engineers*.

James O. Smith is professor of theoretical and applied mechanics at the University of Illinois, and collaborated earlier with Professor Seely in the writing of *Advanced Mechanics of Materials*.

Spectroscopy of Flames

The Spectroscopy of Flames, by A. G. Gaydon, John Wiley & Sons, New York 16, N.Y. 1957. Pages, 279. Price, $9.00.

Dr. Gaydon, associated with the development of many of the last decade's new experimental techniques for controlling flames and exciting flame-type spectra in special sources, discusses these advances in this new book.

Both the techniques and results obtained from them receive special emphasis here. The techniques studied by Dr. Gaydon include: burners for flat diffusion and flat premixed flames; controlled low-temperature flames; flames supported by free atoms; flash photolysis; shock-tube excitation and the use of isotope tracer methods. In addition to a discussion of flames supported by air or oxygen, the book gives an account of flames supported by fluorine and other halogens and by oxides of nitrogen.

A special chapter on flame spectrophotometry is also supplied by the author. Here, he explains how current knowledge of excitation processes and equilibrium conditions in flame gases may be applied to the use of spectra excited in flames for the purpose of chemical analysis.

Dr. Gaydon has been engaged in full-time research in molecular spectroscopy and application to flame processes since 1932. He has held various research fellowships and is now Warren Research Fellow of the Royal Society.

Company Opens Two Metallurgical Labs

Two new metallurgical laboratories have been put into operation by Gardner-Denver Company, according to G. V. Leece, president. One will serve the plants located at the company's headquarters in Quincy, Ill. and the other is located at the Keller Tool Division in Grand Haven, Mich.

"These new laboratories will help maintain and improve the quality of our products and guide us toward better manufacturing methods," Leece said. Gardner-Denver makes pumps, rock drills, compressors and air tools for petroleum, mining, construction and general industry.

The Quincy lab, under the direction of Frank Harness, chief metallurgist, will concentrate on checking incoming bar stock and analyzing nodular iron, castings and forgings produced in the Gardner-Denver foundries.

The new air-conditioned 64 by 90 foot building contains equipment for complete chemical and physical analysis of non-ferrous metals as well as steel and iron. Included are an analytical room with air conditioning fume hoods, a microscope room, polishing facilities for sample preparation, a dark room, equipment for testing hardness by either the Rockwell or Brinell method, a mechanical testing room, and machine shop equipment.

In addition, the lab has special facilities for checking quality of oils, coolants, paint, sand and water used either in Gardner-Denver manufacturing processes or in equipment produced by the firm.

The Grand Haven lab, where Claude Dierdorf is chief metallurgist, is also equipped to analyze the physical and chemical properties of steel and cast iron. The chemical analysis equipment will determine the presence in steel of such elements as carbon, molybdenum, manganese, sulphur, silicon, nickel, chromium and vanadium. Equipment in the physical section will provide information on causes of metal fatigue.

New equipment at Grand Haven includes a metallographic microscope, polishing facilities, a macro camera for photographing properties of parts and a complete dark room.

Equipment for chemical analysis consists of an induction combustion furnace, carbon determination equipment, analytical balance, spectro-photometer and a titration stand. This department is equipped with steel cabinets with acid-proof tops. The rest of the laboratory has matching cabinets wih formica tops and stainless steel sinks.

Gardner-Denver also maintains a metallurgical laboratory at its Denver plant.

Information Research Careers Stimulated

A step to interest technical graduates in scientific information research careers has been taken jointly by Western Reserve University, Cleveland, and Esso Research and Engineering Company, Linden, N. J.

The program provides that a selected graduate alternate between one semester of study at Western Reserve and one semester of professional work at Esso Research, beginning at Esso Research. It is open to graduates with an undergraduate major in chemistry or chemical engineering who will be candidates for either the master's degree or the doctorate in library science, preferably the latter.

The work-study arrangement will continue until the recipient obtains the library science degree. The plan will start in the fall session of 1958 with one award and may be expanded in the future.

The project was developed by Dr. Jesse H. Shera, dean of the School of Library Science at Western Reserve, and William T. Knox, director of Esso Research's recently established Technical Information Division.

While at the company, the award recipient will be employed in the Technical Information Division. Salary will be commensurate with that paid other employees with equivalent qualifications.

Esso Research set up the division earlier this year to speed and simplify the flow of scientific literature. The volume of such information and data has been more than doubling every ten years in the United States. The firm is the scientific and engineering arm of Standard Oil Company (New Jersey) and itself prepares and issues more than 1,500 technical reports a year.

Applicants must meet the formal admission requirements of the School of Library Science and the employment qualifications of Esso Research and Engineering Company.

Growing

The average length of the U.S. automobile has increased some nine inches since 1953, reports *Product Engineering*. There is much less difference now between low-price and high-price models. In fact, low-price cars today are as long as the average of all cars five years ago.

TV for Pilots

Windshield television screens from which pilots can read flight data necessary to operate complex modern aircraft are now possible, reports *Product Engineering*. A thin, transparent, cathode ray picture tube that receives its information from a small airborne computer, does the trick.

News of Engineers

Dr. William L. Everitt, MWSE, dean of the College of Engineering, University of Illinois, was presented in Chicago on Oct. 7 the American Institute of Electrical Engineers' Medal in Electrical Engineering Education. The award was made at ceremonies during the general session of the AIEE Fall General Meeting which held forth at the Morrison Hotel until Friday, October 11.

The presentation was made to Dr. Everitt "in recognition of his distinguished service as a teacher of Electrical Engineering and as evidence of the high esteem in which his contributions to engineering education are held by his fellow members of the American Institute of Electrical Engineers." The citation was signed by Walter J. Barrett, President of AIEE; Karl L. Wildes of the Massachusetts Institute of Technology faculty, chairman of the Members-for-life Committee — sponsors of the Medal; and N. S. Hibshman, AIEE Secretary.

Dr. Everitt began teaching in 1920 as an instructor in electrical engineering at Cornell University. In 1922 he left Cornell for one of two interruptions of his career in education to become engineer in charge of P.B.X. (Private Branch Telephone Exchange) development for the North Electric Manufacturing Company, Galion, Ohio. He returned to teaching in 1924 as an instructor in charge of communications courses at the University of Michigan. In 1926, he joined the faculty of Ohio State University and remained there until 1942 when he left to become director of the Operational Research Staff Office of the Chief Signal Officer, War Department. With the war's end, he returned to education and was named professor and head of the Department of Electrical Engineering at the University of Illinois. He was appointed to his present post in 1948.

Dean Everitt is the author of many articles on communications and has also gained widespread recognition as an inventor in the fields of automatic telephony, radio altimeters for aircarft, directional antenna systems, speech compression and radio tuning systems.

He holds the grade of Fellow, the highest grade in AIEE, and is a former president of the Institute of Radio Engineers.

Dr. Everitt is a native of Baltimore, Md. He graduated from Cornell University with a degree in electrical engineering in 1920 and received an M.S. degree from the University of Michigan in 1926 and a doctorate from Ohio State University in 1933.

* * *

George Lewis Tuve, professor of mechanical engineering and director of Bingham Laboratories, Case Institute of Technology, Cleveland, Ohio has been named to receive the 16th award of the F. Paul Anderson Medal from the American Society of Heating and Air-Conditioning Engineers it is announced by Society President P. B. Gordon, New York, N. Y.

Presentation of the medal is to take place during the Annual Banquet, January 29, which concludes the 64th Annual Meeting of the Society at Pittsburgh, Pa. in the Penn-Sheraton Hotel from January 27 to 29, 1958.

Because Professor Tuve has distinguished himself in the teaching profession and as a consulting engineer, he has been selected to receive this highest award of the Society in recognition of outstanding work in heating, ventilating, cooling and air conditioning.

Professor Tuve assumed the responsibility of director of Bingham Laboratories in July, 1957 after serving as head of the mechanical engineering department of Case Institute since 1945. His association with Case began in 1930 when he became affiliated as an associate professor of mechanical engineering.

He also has earned prominence as a consultant in industry on research and development work for such firms as Allis-Chalmers Manufacturing Co., American Locomotive Co., and the Public Service Company of Northern Illinois.

* * *

Dr. John L. Barnes, one of the country's leading authorities on missile systems and space travel, who resigned the presidency of his own company when he felt it was growing too "earthbound," announced recently the formation of a new organization dedicated to consulting and research in the field of interplanetary travel and "environmental measurements" beyond the atmosphere.

Already incorporated as Systems Corporation of America, the new company —with Barnes as president—began its operation on the first of the year with temporary headquarters at 1007 Broxton Ave., West Los Angeles. No other details have been released, but on the basis of Barnes' background and previous statements it is an obvious assumption that one of S.C.A.'s primary targets will be the moon.

When, two years ago, Barnes relinquished the vice-presidency of Systems Research Corporation (now Aeronutronics) to form his own company, Systems Laboratories Corporation, he prophesied that the exploration of outer space would be a practical reality within

five years and that man would be traveling to the moon within the next decade. At that time he announced that his new company would devote its major effort to helping make space travel possible by concentrating on the technical obstacles that still stood in its way. His partners, however, did not wholly share his views in this respect and last July Barnes sold his stock in the company, bowed out, and began organizing Systems Corporation of America.

As well as his distinguished career in the development of long-range missile systems, including the Navaho and I.C.B.M., Barnes is a well-known textbook author and educator and for the last ten years has been professor of Engineering at the University of California, Los Angeles. The many companies for which he has acted as consultant or engineer include among others Bell Telephone Laboratories, Lockheed Aircraft Corporation and the Ramo-Wooldridge Corporation. He also served for five years as chief of guidance and associate director of Electromechanical Engineering at North American Aviation, Downey.

* * *

Theodore W. Van Zelst, MWSE, recently presented a technical paper at the Mexico City meeting of The American Society for Testing Materials and The Mexican Soil Mechanics Society. The paper, "New Developments in Soil Sampling Apparatus," was one of the 16 papers presented to the 160 Mexican and North American engineers attending the week long conference at the University of Mexico. Van Zelst was also chairman of one of the technical sessions.

* * *

Fred C. Kellogg, president of Pioneer Service & Engineering Co., has announced several changes in that Company's organization, effective January 1, 1958.

H. L. Hoeppner, MWSE, now chief electrical engineer, has been appointed Consulting Electrical Engineer. W. F. Bergmann, senior electrical engineer, will assume Mr. Hoeppner's duties.

Winsor Martin, manager of the Rate and Research Division, who has served Pioneer and predecessors for over 39 years, becomes rate consultant. Active management of the Rate Division will now be assumed by Donald H. Callen.

Stephen Wehner, consulting hydraulic engineer and former chief hydraulic engineer of the company, retires. Wilbur Barrows has succeeded Wehner as chief hydraulic engineer.

E. V. Cullen, vice president and chief purchasing engineer, assumes promotional and special assignments. He will be succeeded by J. J. Cuniffe as chief purchasing engineer.

D. C. Hormell, vice president and chief engineer, becomes vice president and consulting engineer and is succeeded by Carl R. Barthelemy as vice president and chief engineer. L. J. Booth, mechanical engineer, becomes chief mechanical engineer, replacing Barthelemy.

L. M. Davis has been elected a vice president with the title vice president and chief structural engineer.

Missilemen Have Neutralizer Showers

American missilemen who are accidentally contaminated with liquid rocket fuels now have a portable shower which quickly cleanses them.

The Lofstrand Company, Rockville, Md., has made 2,000 of these units — called "Rocket Propellant Personnel Neutralizers"—for the U.S. Army.

The shower units were designed for use at tactical missile sites. They are sent into the field with the men who set up, fuel and launch missiles.

The portable shower was developed at the U.S. Army Corps of Engineers research and development laboratories, Fort Belvoir, Va.

J. Slater McHugh, vice-president and general manager of Lofstrand, said the device will now be produced for industrial use.

He pointed out that the shower could also provide protection for workmen in the chemical industry, oil fields, petroleum processing plants, plastics industry, munitions and explosives plants, as well as industries using radio-active materials.

In addition, Mr. McHugh explained, the mobile shower could enable civil defense teams to quickly clean out areas hit by radio-active fallout, particularly since units could be moved to disaster sites where extra power might not be available.

The shower has a 100-gallon water tank with two air or nitrogen cylinders. When the technician who has been contaminated places his foot on the shower treadle, the air pressure—45 pounds per square inch—forces the water out the spray head.

Mounted on skids, the entire unit weighs 570 pounds and is constructed primarily of Reynolds aluminum.

It is 3 feet wide, 4½ feet long, and 7½ feet high. It can be folded for moving from one site to another.

The water tank is so well insulated that four truck flares or highway torches will keep the water at body temperature when the thermometer reads 25 degrees below zero.

An electrical immersion heating unit is available in case the shower is to be used near explosives where open flames would be too dangerous.

The unit contains two other built-in safety features: A pressure relief valve, and vent holes in the side of the fill cap to warn audibly of pressure within the tank when the cap is loosened.

WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the MIDWEST ENGINEER magazine.

Melvin E. Coobs, Sales & Application Engr., Johnson Service Co., 1355 W. Washington Blvd.

William Schmidt, Structural Engineer, 2834 W. Addison St. (Rein.)

Linvell A. Cox, Designer, Kraft Foods, 500 Peshtigo Ct.

John E. Jackson, Locomotive Engr., Illinois Central Railroad, 135 E. 11th Pl.

Hugo Boeckmann, Design - Draftsman, Soiltest, Inc., 4711 W. North Av.

Herman J. Laude, Senior Engineer, The Peoples Gas Light & Coke Co., 122 S. Michigan Av.

Joseph Philippi, Manager, Johnson Service Co., 1355 W. Washington Blvd.

S. D. Reed, Field Engineer, Line Material Industries, 4700 Lake St., Melrose Park, Ill.

Dudley D. Gallup, Chicago Dist. Mgr. of Sales, G. O. Carlson, Inc., 5903 W. Chicago Av.

Quigley N. Fletcher, Const. Foreman & Engr., Hill Homes, Inc., 3201 Kirchoff Rd., Arlington Heights, Ill.

Kirby L. Strickland, Designer-Estimator, American Bridge Div., U. S. S. Corp., 208 S. LaSalle St.

February 16-22 Will Be Engineers' Week

Fourteen leading engineering figures will act as sponsors for the 1958 National Engineers' Week, Feb. 16-22.

The list of sponsors was announced by John L. Bahr, national chairman of the annual observance held each year during Washington's birthday week under the general sponsorship of the National Society of Professional Engineers.

The fourteen individual sponsors are: James R. Killian, Jr., president, MIT, and newly appointed special assistant to President Eisenhower for science and technology; Allen B. DuMont, chairman of the board, Allen B. DuMont Laboratories, Inc.; Major General Emerson C. Itschner, chief of engineers, United States Army; Charles F. Kettering, General Motors Corporation; Clarence H. Linder, vice president, General Electric Company; Thomas E. Murray, consultant, Joint Committee on Atomic Energy; Granville M. Read, chief engineer, E. I. du Pont de Nemours and Company; Rear Admiral H. G. Rickover, chief of naval reactors, United States Atomic Energy Commission; Royal W. Sorensen, California Institute of Technology; Philip Sporn, president, American Gas and Electric Company; David B. Steinman, consulting engineer; Bertram D. Tallamy, Federal Highway Administrator; Charles Allen Thomas, president, Monsanto Chemical Company; and Robert E. Wilson, chairman of the board, Standard Oil Company of Indiana.

New Type Structure To Be Described

The fabrication of a new type of structure used in aircraft and missile construction will be described at the fourth annual Midwest Welding Conference to be held in Chicago on Jan. 29 and 30.

Frank J. Filippi, project liaison engineer, Solar Aircraft Co., San Diego, Calif., manufacturer of the material which has a high strength-to-weight ratio, will explain the process in a paper titled "Fabrication of Brazed Honeycomb Sandwich Panel."

Filippi will speak at the Jan. 29 afternoon session of the two-day conference sponsored by Armour Research Foundation of Illinois Institute of Technology and the Chicago Section of the American Welding Society.

Power Conference Is Set for March 26

The 20th anniversary meeting of the American Power Conference will be held March 26-28, 1958, at the Hotel Sherman, Chicago.

The conference, sponsored annually by Illinois Institute of Technology in cooperation with 14 colleges and universities and nine technical societies, provides a forum for discussion of problems and exchange of information concerning the electric power industry and associated activities, including utilization, conservation, fuels, water technology, research, maintenance, sales and management.

It is attended each year by 3,000 or more business and industrial executives, power industry officials, engineers, educators, and government officials.

The colleges and universities cooperating in the conference are Illinois, Iowa, Iowa State, Michigan, Michigan State, Northwestern, Purdue, Minnesota, Wisconsin, Texas A. & M., New York, California Institute of Technology, Georgia Institute of Technology, and Massachusetts Institute of Technology.

The cooperating societies besides the Western Society of Engineers, are American Institute of Chemical Engineers, American Institute of Electrical Engi-

neers, American Institute of Mining, Metallurgical and Petroleum Engineers, American Society of Civil Engineers, American Society of Heating and Air Conditioning Engineers, American Society of Mechanical Engineers, National Association of Power Engineers, and Engineers' Society of Milwaukee.

Air Structures May Help Conquer Space

Air supported structures—which enclose outdoor swimming pools during winter months—might some day be used to enclose space platforms in the sky.

This prediction was made in Chicago Dec. 11 by Walter W. Bird, the engineer who developed the air structures, at the third National Construction Industry Conference in the Congress Hotel.

The two-day meeting, sponsored by Armour Research Foundation of Illinois Institute of Technology, was attended by more than 700 representatives of the building and related industries.

Speaking on "Air Supported Structures," the president of Birdair Structures, Inc., Buffalo, N.Y., said that many design problems must be solved, but that the air structure would have an important place in man's conquest of outer space.

The air inflated structure, he said, offers a possible way of carrying up into space a lightweight, preassembled unit which could be quickly and easily erected.

"Such structures could serve as temporary enclosures in which atmospheric pressure could be maintained to facilitate work, as observation domes on small manned satellites, or as permanet space platforms," he added.

The air structure is a uniquely different type of building constructed of a strong, thin, flexible, lightweight material, Bird explained. It is stiffened and stabilized solely by maintaining a small amount of air pressure within the unit, and requires no supporting poles or framework of any kind.

"Although light in weight and portable, it is resistant to high winds and heavy snow loads," he added.

Bird noted that the acceptance of air structures in their first application as radomes—covers to protect radar installations from foul weather—immediately led to their consideration for other military and commercial uses.

Design studies have been made, he said, for their use as portable hangars, military shelters for personnel and equipment at remote or temporary bases, and gas-tight enclosures for protection against bacteriological or radiological warfare.

Bird also pointed out commercial uses for storage or warehousing, construction shelter, carnival enclosures, stadium coverings, and enclosures for outdoor skating rinks, tennis courts and swimming pools.

In designing the structures, five important factors must be considered, Bird said. These include: knowledge of loads which will be required for the intended use, avoidance of concentrations of stress, use of materials with high test resistance, good ground anchorage, and maximum joint efficiency.

The air structure has proven to be a practical structural form for many applications, Bird said.

"Its low cost, combined with structural efficiency, adaptability for portable or temporary use, and lines that can be adapted to modern design, promise an interesting future for this new type of structure."

Index of MIDWEST ENGINEER *Advertisers*

Obituaries

On October 16, 1957 Theodore V. Purcell, Member of Western Society passed away. At the time of his death, Mr. Purcell, at 92, was one of the Society's oldest members.

He was a vice-president of Peoples Gas Light & Coke Company until his retirement in 1935. Mr. Purcell joined the company in 1907 and became vice-president in 1924.

The Society, on behalf of its members, wishes to express sincere sympathy to Mr. Purcell's family.

Synthetic Sapphire Serves in Detector

The fast-growing field of infrared instrumentation requires, above all, reliable and sensitive infrared detectors. An outstandingly successful example of such a detector uses synthetic sapphire to serve two important functions: as a heat sink and as a transmission window.

The detector is one type of OptiTherm Infrared Detector, a product of Barnes Engineering Company, Stamford, Conn. The sapphire components are a product of Linde Company, Division of Union Carbide Corporation, New York, N.Y.

Infrared detectors are used as sensing elements in radiometers, pyrometers, infrared spectrometers, gas analyzers, product control units, refractometers, missile guidance systems, and many other devices both in production and in the development stage.

The detector is the key element of the infrared system whose main elements are these: an entrance window, to admit infrared radiation; an optical system to focus the intrared waves; a sensing or detection device to convert the infrared radiation into electrical energy; an amplification system; and a direct reading device, such as a cathode ray tube, meter, or paper chart recorder.

It is thus of the utmost importance that the sensing element be fast, rugged and sensitive. The heart of the sensing element or detector is the thermistor (thermally sensitive resistor) which is made of heat sensitive electrical semiconductors. Two flakes of thermistor material are mounted on a housing. One unit is blackened and attached to a heat sink, in this case a sapphire heat sink. The other unit is shielded to provide a compensating element. The difference in voltage resulting from the decreased resistance of the exposed, active thermistor and the unvarying resistance of the shielded element can be amplified to set up a useful signal.

As a heat sink, Linde sapphire provides high electrical resistance and high thermal conductivity — both important qualities for fast, sensitive response.

As a window, Linde sapphire is used in detector applications which require transmission of the visible spectrum with a cutoff of about 6.0 microns in the infrared band.

Sapphire has other unique characteristics which make it an ideal infrared system material. At temperatures above 500 deg. C., for instance, sapphire retains its infrared transmission characteristics. No other transmission material known will continue to transmit portions of the infrared spectrum at this elevated temperature or beyond.

Another unique group of properties which make sapphire most useful in this field is its strength at elevated temperatures and its corrosion and abrasion resistance. Other window materials fail because they are soft or easily attacked by moisture, acids and high temperatures.

Sapphire is readily sealed to metals and ceramics, thus it can be made part of any electronic assembly. Sapphire is priced competitively with sintered materials, and it is avaliable in a variety of shapes and sizes for windows, domes, rods and tubes. A recent development has made sapphire disks of up to 5 inches in diameter available for transmission windows.

Foundation Testing Upswing is Predicted

A great upswing in the amount of engineering testing of foundations and material is predicted by William R. Fuerst for Central America. Fuerst, Soiltest, Inc. engineer, recently returned from an extensive visit to Guatamala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama and reported on growing interest in the application of some of the more advanced testing methods and use of the most up-to-date testing equipment everywhere he traveled.

Most engineering testing is done today, according to Fuerst, by government laboratories or by universities, but he reported growing interest among some of the engineers in the establishment of private testing labs.

"Central America is alive with construction projects—roads and highways, dams, buildings and there seems to be a growing realization that proper testing practices can be an important factor in both building economy and safety," observed Fuerst.

There is some evidence that the tendency to overbuild, "build it strong enough for the first time," can be reduced. Proper testing can provide information so that the maximum safety and strength achievable with the minimum possible design can be ascertained. This makes it possible to reduce over-design to a minimum and effect savings in both time and material and yet provide a sufficiently large coefficient of safety to cope with natural calamities, wear and tear and any chance of underdesign.

Soiltest sales representatives were visited in all of the Central American countries.

a good advertising medium

FOR ALERT ADVERTISERS

Midwest Engineer

because . . .

- Circulation in America's industrial and residential heart.
- The direct path to specifying, purchasing, and industrial executives — those who say yes.
- Provides coverage in all engineered industries.
- Opens a live market area for machinery, fabricated products, industrial equipment, materials of construction, parts, tools, products and services.
- The mirror of the coordination of engineering and civic interests.
- Advertising rates are extremely low for coverage of this big market.

Western Society of Engineers

84 E. Randolph Street
Chicago 1, Illinois

Electric Panel Heating with Reinforcing Steel

How Edison Engineers use electricity with conventional reinforcing steel mesh to provide low-cost heating.

A completely new concept in low-cost heating for large-area buildings is being demonstrated by Commonwealth Edison Engineers. Large industrial and commercial customers can now heat electrically for certain applications in close competition with combustible fuels by using the reinforcing steel in concrete floors as a circuit to carry low-voltage electrical energy during their "off-shift" periods.

In this new method of heating, any of the conventional reinforcing steels, while doing a normal reinforcing job, can also carry electric current and heat the concrete floor. The reinforcing steel is imbedded deep enough in the concrete so that a "bank" of heat is accumulated in the floor and in the ground below. When the current is turned off, the stored heat continues to warm the building.

If a more sensitive heating system is desired, the grids are placed nearer to the surface.

This type of radiant heating offers several important advantages for "large use" electrical customers contemplating the erection of large buildings:

1. The period of current flow in the reinforcing steel can be regulated to coincide with a customer's own "off-shift" periods. Thus he can take full advantage of the large-use benefit feature in his rates.
2. Heat output of floor grids can be varied by design to provide heat exactly where it is needed and in the exact quantities required.
3. The entire floor area is heated, eliminating hot and cold spots.
4. Because of the radiant effect of the floor, building occupants feel comfortable with air temperatures somewhat lower than with conventional space heating.

Such constant alertness and ingenuity is characteristic of Edison Engineers in their continuing search to further extend the advantages of low-cost electric service.

Commonwealth Edison Engineer, Bob Jonelis, explains to Ralph Masek, engineering student, how the steel reinforcing grid serves as a circuit for the low-voltage current.

Edison architect Bob Geyer checks with Bob Jonelis on the radiant effect of a concrete floor heated with conventional reinforcing steel.

Commonwealth Edison
AND
Public Service Company

Pioneers in Progress for Over 70 Years

eel

gi-
w-

n